

OFFSET PALLET-RACK SAFETY NET SYSTEM

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BACKGROUND OF THE INVENTION

Field of the Invention

10       The present invention relates to material-handling systems, and more particularly to safety netting systems that protect workers and customers in the aisles below pallet shelves.

15       Description of Related Art

Shelves and racks are a convenient way to store items, and can maximize floor space when palleted material is stored many levels high. A typical warehouse retail store, e.g., The Home Depot, has material racks that are two, three, and four levels high. Heavy items, like backup store inventory on a pallet, are placed and fetched from high above by a forklift. These heavy items can weigh anywhere from ten to two hundred pounds.

20       Heavy items placed 10-20 feet high above aisles in material racks and on shelves can present a significant and not-so-rare personal injury risk. Shaking, bumping, and poorly stacked items can come tumbling down and hurt people below, or at a minimum damage the product.

25       Not surprisingly, a number of different devices and methods have evolved to address these problems. The law too has entered the picture with OSHA regulations, and personal injury lawsuits. New company procedures, union work rules, and plain common sense now dictate that an effective

restraint, barrier, or guard system be installed on the higher shelves and rack to prevent falling debris.

As could be expected, some methods and devices are better than others. Conventional safety products can be expensive to buy, and difficult to work with or install. A simple netting secured all around the shelf opening can be effective if the netting is strong enough and secured well. But the way the netting is secured and constructed can mean opening the net to access the shelf is made very difficult, in some cases requiring a technician to climb high above and use hand tools to open and/or close the net.

A universal safety net system for pallet racks is described by Barry Cole in United States Patent 4,981,225, issued Jan. 1, 1991 (Cole '225). A framework intended to support pallets of heavy material is faced with a heavy duty netting that prevents accidental falls to the floor of loose material. Such netting is tied at its edges to a perimeter of taut suspension cables. In Fig. 4 of Cole '225, an offset configuration is shown where the netting is stood out a few inches away from the front of the pallet shelving framework. Such offset is implemented by lower and upper universal offset members 60 and 70.

Such prior art offset brackets are not adjustable in how far they offset the netting from the face of the pallet rack because they U-bolt to the front faces of the framing. The way these are attached to the framing further does not provide maximum rigidity to keep the netting cables taut.

SUMMARY OF THE INVENTION

Briefly, a material-rack safety-netting embodiment of the present invention comprises a safety netting, a perimeter cable suspension system for the netting, offset brackets to anchor the perimeter cable suspension system away by adjustable amounts, and vertical extension posts that bolt to the face of the upper frame parts of a pallet rack. The curtain netting is supported around its edges by attachments to taut wire ropes that are supported by the offset brackets. Such offset brackets slip over the vertical frame parts of the pallet rack. The brackets are always flush ended with the netting, and include several mounting points for the frame attachment.

In one embodiment, a choice of offsets of 3", 6", 9", and 12" is provided for the netting by different attachment points on the offset brackets.

An advantage of the present invention is that a safety netting is provided that does not get snagged by people or equipment in the aisle ways.

Another advantage of the present invention is that a safety netting is provided that is easy to install.

A further advantage of the present invention is that safety netting systems are provided that are simple to operate.

The above and still further objects, features, and advantages of the present invention will become apparent upon consideration of the following detailed description of specific embodiments thereof, especially when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a safety netting system installed on a material rack shelving unit using offset  
5 brackets;

Figs. 2A-2D are, respectively, perspective, top, end, and side view diagrams of an offset bracket like that used in the system of Fig. 1; and

Figs. 3A-3F represent an assembled offset bracket system in which an offset bracket is attached to a vertical pallet rack extension. In Fig. 3A, the offset bracket is attached at its minimum offset position, wherein the front part where the netting attaches is at the left. In Fig. 3B, the offset bracket is at a next offset position. In Fig. 15 3C, the offset bracket is attached at another more extreme offset position. In Fig. 3C, the offset bracket is at its most extreme offset position. In Fig. 3E, a perspective view diagrams the vertical pallet rack extension slipped over a front frame part of a pallet rack and is secured with bolts. In Fig. 3F, the vertical pallet rack extension is shown being secured with an alternative arrangement of bolts to a plate bar 314.

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DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 illustrates a pallet-rack safety-netting system embodiment of the present invention, referred to herein by the reference numeral 100. The pallet-rack safety-netting system 100 comprises a number of extension brackets 101-109 that are bolted to three respective pallet rack vertical

frame sections 110-112. A set of suspension cables 114-125 are strung taut between the offset brackets 101-109 and support safety nets at their perimeters. For example, a safety net 126 is suspended away from the pallet rack  
5 framing by vertical cables 117 and 122, and horizontal cables 121 and 123; and a safety net 128 is suspended between vertical cables 120 and 124, and horizontal cables 123 and 125. The nets can be attached to the cables every few inches by nylon cable ties or metal snap-hooks.

10 Embodiments of the present invention permit the safety nets to be positioned at a variety of clearances from the face of the pallet rack framing. Such clearance is needed when the pallets loaded on the pallet rack have oversized material on them. The netting itself is provided to protect  
15 people in the aisleways from heavy material that might fall off the pallets in the racks. The offset brackets can be attached to either vertical frame sections of the pallet rack or to extensions of the vertical frame sections.

20 Figs. 2A-2D represent an offset bracket embodiment of the present invention, and is referred to herein by the general reference numeral 200. The offset bracket 200 can be used for offset brackets 101-109, Fig. 1. The preferred construction is generally in the form of a U-channel open at one end, as can be seen in Fig. 2B. The open end slips  
25 around the vertical frame sections 110-112, Fig. 1, and is just wide enough to accommodate the width of the frame section. For example, 3" inside. A pair of bolts is used to secure each bracket on the pallet rack at particular heights above the floor.

30 The offset bracket 200 comprises a first arm 202, a second arm 204, and an end-plate 208. A typical height is 4" and a typical length is 15-5/8". Such form a box-section at the closed end and is very rigid and stiff so that the

bracket can well-support and anchor the set of suspension cables 114-125 strung taut between the offset brackets 101-109, Fig. 1. The box section is suggested in the drawings as being separate steel sheetmetal pieces that interlock  
5 with tabs. Alternatively, the section could be welded.

Two horizontal suspension cables can be accommodated by a pair of right-side holes 210 and 211 and their counterparts on the left side of bracket 200. One could anchor and run left to support a netting on the left, and  
10 the other cable could anchor at the bracket and run to the right.

In the bracket 200 illustrated in Figs. 2A-2D, there are four pairs of bolt holes 212-219 provided on the left and right arms for mounting the bracket to the vertical  
15 frame parts of a pallet rack. Only the ones on the right arm 204 are called out in Figs. 2A-2D. These bolts holes 212-219 are horizontally spaced to provide a range of offset adjustments, e.g., 3", 6", 9", and 12". Other spacings are possible and will be dictated by the applications.

20 Two vertical suspension cables can be accommodated by a pair of top-side holes 220 and 221 and their counterparts on the bottom side of bracket 200. One could anchor and run up to support a netting above, and the other cable could anchor at the bracket and run down toward the floor.

25 The pairs of holes 210 and 211 for the horizontal suspension cables are offset slightly differently from the pairs of holes 220 and 221 for the vertical suspension cables, e.g., so the cables do not interfere at their points of criss-cross inside the box end of bracket 200.

30 Figs. 3A-3F show an assembled offset bracket system 300 in which an offset bracket 302 is attached to a vertical pallet rack extension 304. In Fig. 3A, a pair of bolts 306 and 307 are used to attach the offset bracket 302 at its

minimum offset position, e.g., 3" offset. The front part where the netting attaches is at the left. In Fig. 3B, bolts 306 and 307 attach the offset bracket 302 at a next offset position, e.g., 6" offset. In Fig. 3C, bolts 306 and 5 307 attach the offset bracket 302 at another more extreme offset position, e.g., 9" offset. In Fig. 3C, bolts 306 and 307 attach the offset bracket 302 at its most extreme offset position, e.g., 12" offset. In Fig. 3E, the vertical pallet rack extension 304 is shown slipping over a front frame part 10 308 of a pallet rack and is secured with bolts 310 and 311. In Fig. 3F, the vertical pallet rack extension 304 is shown being secured with an alternative arrangement of bolts 312 and 313 to a plate bar 314.

Although particular embodiments of the present 15 invention have been described and illustrated, such is not intended to limit the invention. Modifications and changes will no doubt become apparent to those skilled in the art, and it is intended that the invention only be limited by the scope of the appended claims.